

What is claimed is:

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1. A gas concentration measuring apparatus comprising:  
a gas concentration sensor outputting a signal as a function of  
concentration of a given component of gasses;

a signal processing circuit processing the signal outputted from  
said gas concentration sensor to produce a voltage signal indicative  
of the concentration of the given component of the gasses; and

a conductor electrically connecting said gas concentration  
sensor and said signal processing circuit for transmission of the  
signal, the conductor having a length which is determined as a  
function of a level of the signal outputted from said gas  
concentration sensor, the weaker the level of the signal, the shorter  
the length of said conductor.

15 2. A gas concentration measuring apparatus as set forth in claim 1,  
further comprising a connector for connecting said gas  
concentration sensor with an external device, said connector having  
disposed therein said signal processing circuit.

20 *Sab A2* 3. A gas concentration measuring apparatus as set forth in claim 1,  
further comprising an impedance measuring circuit measuring an  
impedance of a sensor element of said gas concentration sensor,  
said impedance measuring circuit being integrated in a single unit  
25 together with said signal processing circuit.

4. A gas concentration measuring apparatus as set forth in claim 1,  
further comprising a heater which heats up a sensor element of said  
gas concentration sensor and a heater control circuit which controls  
a power supply to said heater, and wherein the heater control circuit  
5 is integrated in a single unit together with said signal processing  
circuit.
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5. A gas concentration measuring apparatus as set forth in claim 1,  
wherein the gas concentration measuring apparatus is mounted in a  
10 vehicle, and wherein the weaker the level of the signal is, the shorter  
a distance between said gas concentration sensor and said signal  
processing circuit.
6. A gas concentration measuring apparatus as set forth in claim 1,  
15 wherein said gas concentration sensor includes a first cell  
responsive to application of a voltage to discharge oxygen contained  
in the gasses outside said gas concentration sensor, producing a  
first electric current as a function of concentration of the discharged  
oxygen and a second cell responsive to application of a voltage to  
20 produce a second electric current as a function of concentration of a  
specified gas component contained in the gasses from which the  
oxygen is discharged by the first cell.
7. A gas concentration measuring apparatus as set forth in claim 1,  
25 wherein said signal processing circuit has a function of  
compensating for a unit-to-unit variation in characteristic of said

gas concentration sensor.

8. A gas concentration measuring apparatus as set forth in claim 7,  
wherein said signal processing circuit corrects an output  
5 characteristic of said gas concentration sensor so as to agree with a  
desired one.

9. A gas concentration measuring apparatus as set forth in claim 3,  
wherein said impedance measuring circuit has a function of  
10 compensating for a unit-to-unit variation in characteristic of said  
gas concentration sensor.

10. A gas concentration measuring apparatus as set forth in claim 9,  
wherein said impedance measuring circuit produces an impedance  
15 signal indicative of the impedance of the sensor element of said gas  
concentration sensor and corrects the impedance signal so as to  
eliminate a variation in the impedance signal caused by the unit-  
to-unit variation in characteristic of said gas concentration sensor.

*Sul A4* 20 11. A gas concentration measuring apparatus as set forth in claim 4,  
wherein said heater control circuit connects with said heater  
through a power supply conductor for supplying the power to said  
heater, said heater control circuit having a function of minimizing an  
error component caused by a resistance value of the power supply  
25 conductor.

12. A gas concentration measuring apparatus as set forth in claim 1,  
further comprising an impedance measuring circuit measuring an  
impedance of a sensor element of said gas concentration sensor, a  
heater heating up a sensor element of said gas concentration sensor,  
5 and a heater control circuit which controls a power supply to said  
heater, and wherein said signal processing circuit, said impedance  
measuring circuit, and said heater control circuit are formed on a  
bare chip mounted on a ceramic substrate.
- 10 13. A gas concentration measuring apparatus comprising:  
a gas concentration sensor outputting a signal as a function of  
concentration of a given component of gasses;  
a signal processing circuit processing the signal outputted from  
said gas concentration sensor to provide a voltage signal indicative  
15 of the concentration of the given component of the gasses; and  
a connector having disposed therein said signal processing  
circuit, said connector having a first end coupled to said signal  
processing circuit and a second end providing electrical connection  
with an external device to transmit the voltage signal to said external  
20 device.

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